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FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH
COLUMBIA

Williston Reservoir 1989 Creel Report

B. G. Blackman and K. Newsholme
May 1993

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The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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WILLISTON RESERVOIR

1989 CREEL REPORT

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and
K. Newsholme

May 6
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SUMMARY

1. The 1989 creel flight surveys indicated that 3081 angler days were spent on Williston Reservoir from May 20th to September 4th 1989. This is a decline of 40% in comparison with the 1977 creel survey, although methods and locations were different.

2. Angler effort was highest in the Peace Reach(65%) followed by the Parsnip(25%) and Finlay Reaches(10%).

3. Estimates from shore based surveys located at Portage Mountain Yacht Club (Dunlevy) and Finlay Bay, indicated a catch per unit effort of 0.48 and 0.29 fish per hour respectively.

4. Angler use, based on the creel flights indicates that in the Peace Reach anglers fished primarily in the reservoir (54%) and embayments (26%). In the Finlay Reach 63% of the anglers were fishing the rivermouths. The Parsnip Reach was used by anglers fishing primarily in the river mouths (25%) and embayments (68%).

5. The Peace Reach (Dunlevy) survey found 61% of the anglers were local(lived within 125 km of the reservoir), 37% were from Alberta and 1% were from other areas in B.C. The survey from Finlay Bay found 50% of the anglers were local, 9.6% were from other areas of B.C., 33% were non B.C. Canadians (Alberta) and 6.7% were from the U.S.A.

6. There were significant changes in the species composition of the angler catch in comparison to a creel survey conducted in 1977 . Arctic grayling represented 58% of the catch in the Peace Reach in 1977 and less than 1% in 1989. Rainbow trout have replaced grayling as the dominant sports catch in the Peace Reach and kokanee are present in the creel in increasing numbers. Bull trout have increased in importance for anglers accessing the reservoir from Finlay Bay.

7. No size at age data are available from previous creel surveys. However size at age data collected in 1974 & 1975 (Bruce and Starr, Barrett and Halsey) when compared to this creel and other recent studies (Blackman 1992 & 1993) indicates no changes in bull trout size at age. There appear to be fewer large (> 6 kg) bull trout but this cannot be confirmed from the data. Rainbow trout (age 3+ to 5+) are significantly ($p < 0.05$) smaller than in the mid 1970's. To a certain extent, this trend is to be expected because the productivity of a reservoir normally declines as the reservoir ages (Frey 1967).

INTRODUCTION

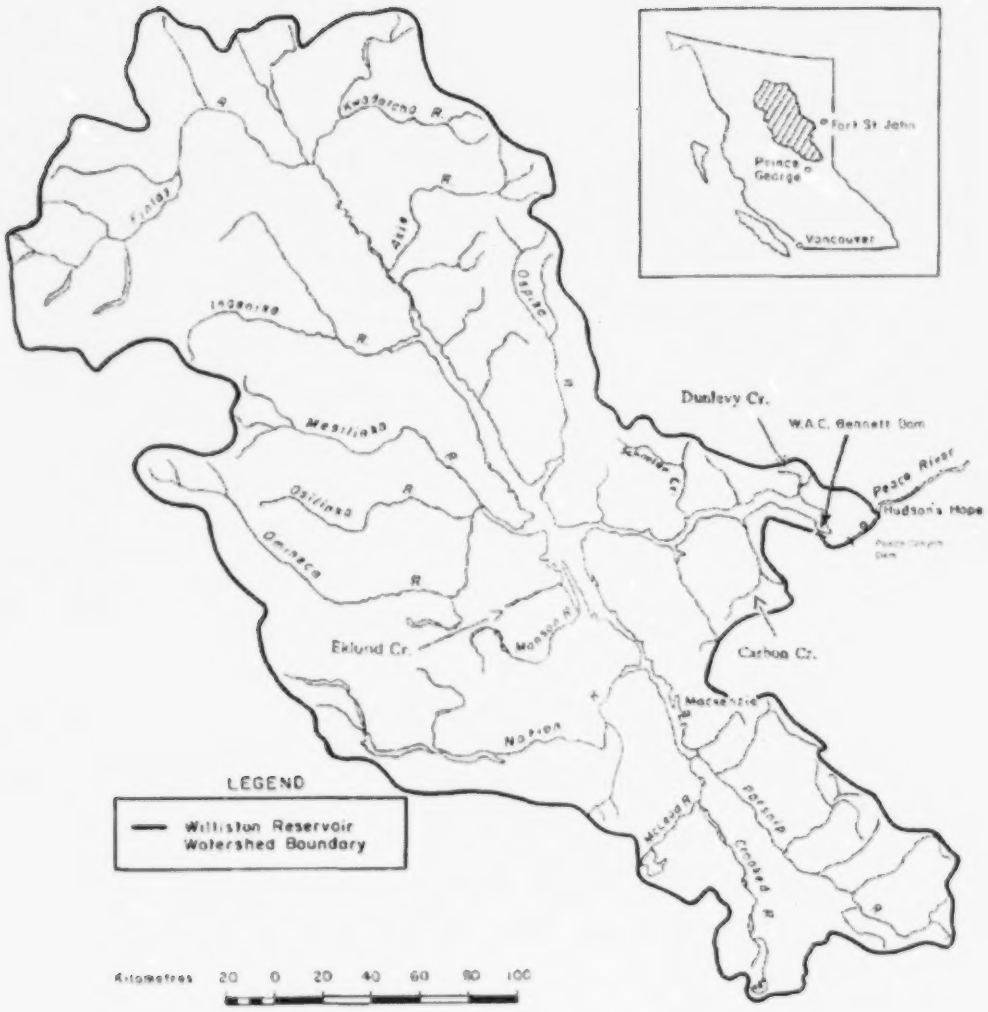
Williston Reservoir is located in North-eastern British Columbia in the Rocky Mountain trench (Fig. 1). It was formed following the construction of the W.A.C. Bennett Dam in 1968. The dam impounded three major rivers, the Peace, the Finlay and the Parsnip. The result was the largest body of freshwater in British Columbia with a maximum surface area of 1,736 square km and a shoreline perimeter of 1770 km. This body of water is well known for its sudden and violent storms and during the early years of the reservoir, floating debris made boating impossible in many areas.

In 1988 the Williston Fisheries Compensation Program was jointly initiated by B.C. Hydro and the Ministry of the Environment to compensate for impacts on and changes to the fisheries as a result of the creation of the reservoir. The goals of this program are to evaluate the status and character of various sportfish populations, to identify possible enhancement opportunities and to conduct an enhancement program.

Creel surveys were conducted during the summer of 1989 to complement the evaluations of sport fish populations, and to provide baseline data for the assessment of enhancement activities.

The size and remoteness of the watershed makes conducting an accurate creel survey very difficult and costly. Rapidly developing road systems, numerous access points, isolated logging and mine exploration camps and the fact that a high percentage of access to the reservoir is by boat further complicates any surveys.

In order to allow for some continuity with past and future surveys, the Finlay Bay and Dunlevy areas were chosen as sites for ground based surveys. Angler surveys were conducted in these areas in the past, however rapidly changing angler patterns and access development may make direct comparisons difficult.


Fort St. John
Prince George
Vancouver
Dunlevy Cr.
W.A.C. Bennett Dam
Peace River
Hudson's Hope
Carbon Cr.
Eklund Cr.
Mackenzie
Nation
Omineca R
Osilinka R
Mesilinka R
Ingenika R
Finlay R
Omineca R
Parsnip R
Crooked R
LEGEND
Williston Reservoir Watershed Boundary
Kilometres 20 0 20 40 60 80 100

METHODS

Shore base creel surveys and aerial boat counts were conducted on Williston Reservoir from May to September 1989. Two sites were monitored, Dunlevy at the eastern end of the Peace Reach near the W.A.C. Bennett Dam and at Finlay Bay, the junction of the three reaches (Fig 2). A third land-based creel was conducted at the B.C. Hydro recreation site near Mackenzie, during the July 1st long weekend. Aerial surveys of the entire reservoir were conducted on a weekly basis to evaluate angler use and distribution.

The details of the four surveys are as follows:

1) **Dunlevy Survey** - A creel survey was conducted from the eastern end of the Peace Reach within 10 miles of the W.A.C. Bennett Dam. The majority of the information was gathered at the Portage Mountain Yacht Club. Two other locations in the area included the B.C. Hydro boat launch located adjacent to the Bennett Dam and the mouth of Dunlevy Creek (Fig 2).

   The survey period was from May 20 until September 4, 1989 using a stratified random sample design (Dixon 1986). Sample periods were divided into 6 strata; weekday and weekends, with three time periods, noon, afternoon and evening. Each stratum consisted of a 4 hour shift; noon: 1000 1400 hrs, afternoon: 1400 1800 hrs and evening: 1800 - 2000 hrs. Shifts were random, 5 days a week, however all weekends and holidays are covered by at least one shift. Approximately 85% of the creel shift was spent at the yacht club as that was by far the most popular area in the Peace Reach. The other 2 locations were checked to obtain a count of the boat trailers and to interview shore anglers.

The following information was recorded by the interviewer for each party:

A) Angler

   i) number in party and origin

   ii) hours fished

   iii) area(s) fished

   iv) angling method(s)

   v) species preference

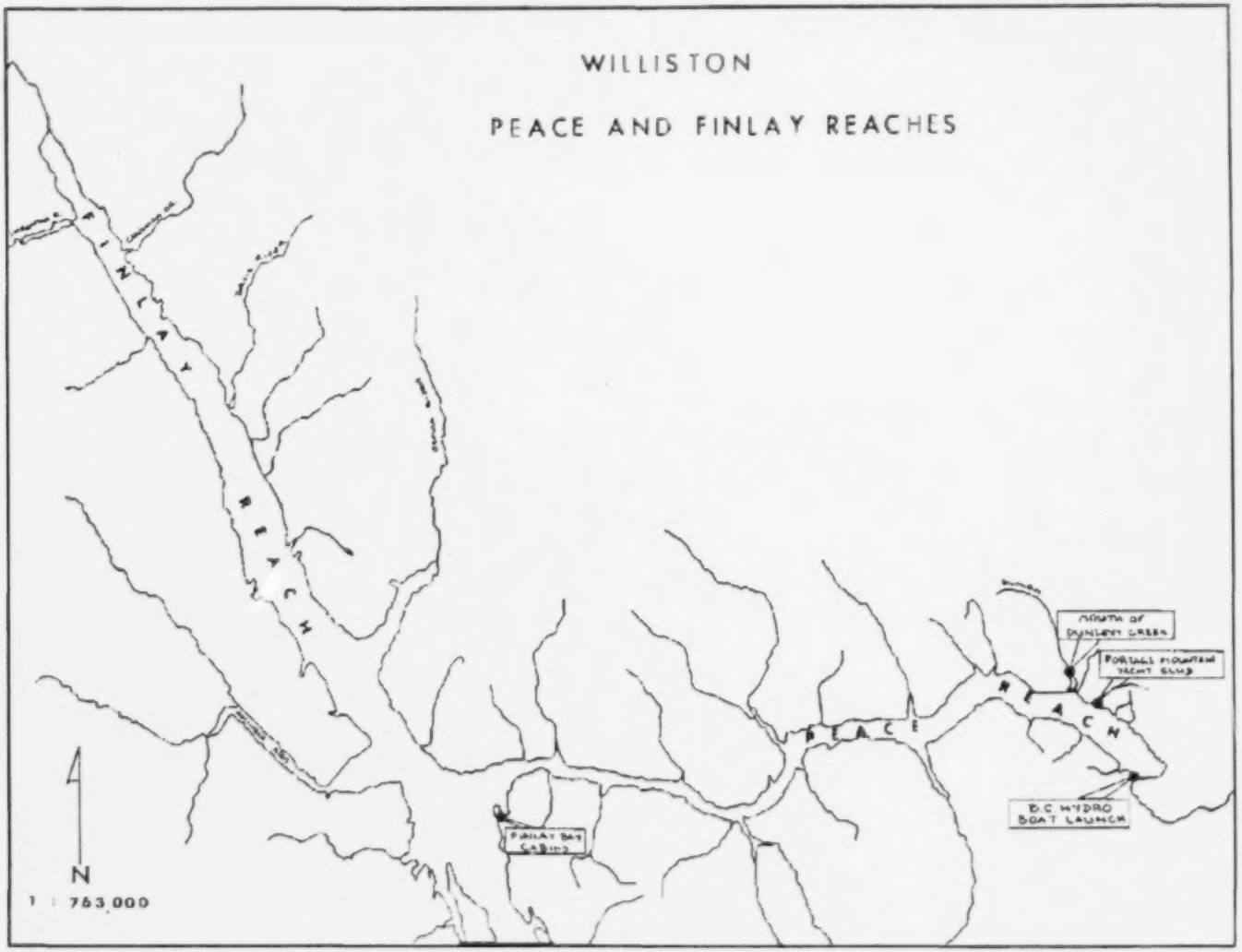


Figure 2. Location of the Finlay and Peace Reach creel sites.

B) Catch

i) number of fish (by species) caught

ii) number of fish (by species) kept

iii) biological samples collected (where possible)

fork length (mm)

weight (g)

sex and obvious stages of maturity

scales or otoliths were collected following standardized methodologies and ages determined

2. **Finlay Bay** - The Finlay Bay creel survey was conducted at the Finlay Bay Cabins by the proprietor, from May 7 until August 30, 1989. Parties stopping at the lodge were interviewed and parties leaving from the Forest Service recreation site were counted or interviewed if possible.

The data collected was the same as that collected in the Peace Reach (Dunlevy)survey, except no fish were sampled.

3. **B. C. Hydro Recreation Site** (Mackenzie) - During the June 30 - July 2 long weekend, a three day creel survey was conducted at the B. C. Hydro recreation site near Mackenzie. This was an informal survey aimed primarily at gathering tissue samples and very little representative data was obtained.

4. **Flight Surveys** - Angler party counts and locations for the entire reservoir were made once a week throughout the summer from a fixed-wing aircraft flying the perimeter of the reservoir. Flight surveys were randomly scheduled for one weekend/holiday day per week as well as one weekday per month. Surveys were usually carried out from 1000 hrs to 1400 hrs. The number and location of both boat and shore parties were recorded on weekly flight maps. All parties observed on the reservoir were recorded as fishing. (The Peace Reach creel survey determined that more than 97% of the parties boating on the reservoir fished during some part of the trip.)

The purpose of the aerial survey was to determine angler distribution and to provide data for an estimation of the total angler effort.

5. **Calculations**

a. Peace Reach - The data obtained in the Peace reach creel survey was divided into weekly blocks. The actual use estimates for each week were determined through arithmetic extrapolation. The formulas used include the following:

Total estimates from sample data $T = \Sigma\ Ni\ \ xi$

Variance - $= \Sigma\ (Ni)^2\ \frac{(Ni-ni)}{Ni}\ x\frac{(si^2)}{ni}$

Confidence Limits (CL)= $\sqrt{var}\ \ x\ 2$

Ni = total number of data points in the population being sampled.
ni = number of data points in stratum "i"
xi = mean of a set of data
s = standard deviation

The Peace Reach and the Finlay Bay creel data were averaged to estimate the number of anglers per party, the angler hours and the catch per unit effort. This data was then used with the aerial count data to estimate total effort etc.

b) Finlay Bay - The Finlay Bay creel survey was carried out on a full time basis (close to a total count). Some anglers using the adjacent boat launch could not be interviewed but counts were kept of the total numbers of boats using the area. Averages from the anglers interviewed were then applied to the observed total. The expanded estimates were then used in the calculations.

c) B. C. Hydro Recreation Site - This creel survey was conducted over a 3-day long weekend. Anglers using the boat launch during that period were surveyed. The data was not expanded to estimate angler effort throughout the summer but was collected only to estimate a catch per unit effort for that time period and to collect tissue samples for use with another program.

d) Flight Surveys - It was presumed most angler (boat) trips were all day and many were overnight trips, based on the other surveys. No allowances were made for evening only fishermen. Parties fishing from shore were included in the angler party counts. Calculations were performed according to methodologies outlined by Dixon 1986. Party size, and C.P.U.E. data was obtained from the shore based surveys and applied to the data from this survey to estimate total effort and harvest.

RESULTS

PEACE REACH CREEL SURVEY

ANGLERS

i) Number and Origin - Interviews were conducted on 119 angling parties with a total of 323 anglers. The expanded number of anglers during the summer creel period was 1,186 ± 310. Local anglers (within 125 km of the reservoir) comprised 61.9% of the anglers interviewed, 0.9% were from other areas in B.C. and 37.2 % were Canadians from outside of B.C. (all were from Alberta).

Use by the local anglers only was :

Fort St. John	69.0%
Hudson Hope	16.5%
Dawson Creek	10.0%
Chetwynd	2.0%
Tumbler Ridge	2.0%
Mackenzie	0.0%

ii) Hours Fished - The 323 anglers surveyed fished a total of 1,794.5 hours or 5.5 hours per trip. The expanded number of angling hours was 7,465.7 ± 3,575.6.

iii) Area Fished - Most (94%) boat anglers remained within the Peace Reach, no anglers fished in the Parsnip Reach and a small number (6%) angled in the Finlay Reach. Approximately 71% of the anglers concentrated their efforts in stream embayments (no distinction was made between river mouth and embayment as in the flight surveys), 27 % fished in the reservoir and only 2 % angled in tributaries upstream from the mouth (Figure 3 also see Appendix I).

iv) Angling Method - Angling methods used by the 119 parties were:

Fly	2	
Spin casting	67	
Trolling	66	
Bait	32	(may include trolling or casting)

Percentages for angling method were not calculated because many people used more than 1 angling method.

v) Species Preference - Species preferred by the angling parties surveyed (some of the anglers chose 2 species):

	First Choice		Second Choice	
	No.	%	No.	%
Rainbow trout	64	53.3%	8	25.8%
Bull trout	27	22.5%	12	38.7%
Kokanee	23	19.2%	10	32.2%
Whitefish	2	1.6%	1	3.2%
Arctic grayling	1	0.8%		
ANYTHING	3	2.5%		

CATCH

i & ii) Numbers of fish by species caught and kept -Rainbow trout(Rb) were the most abundant species caught or kept followed by bull trout(Bt), kokanee(Ko), whitefish(WF) and Arctic grayling(Gr). Table I indicates the actual numbers recorded as well as the estimated expanded data.

iii) Fish Samples- The mean length, weight and condition factor of the 4 species of game fish are presented in Table II.

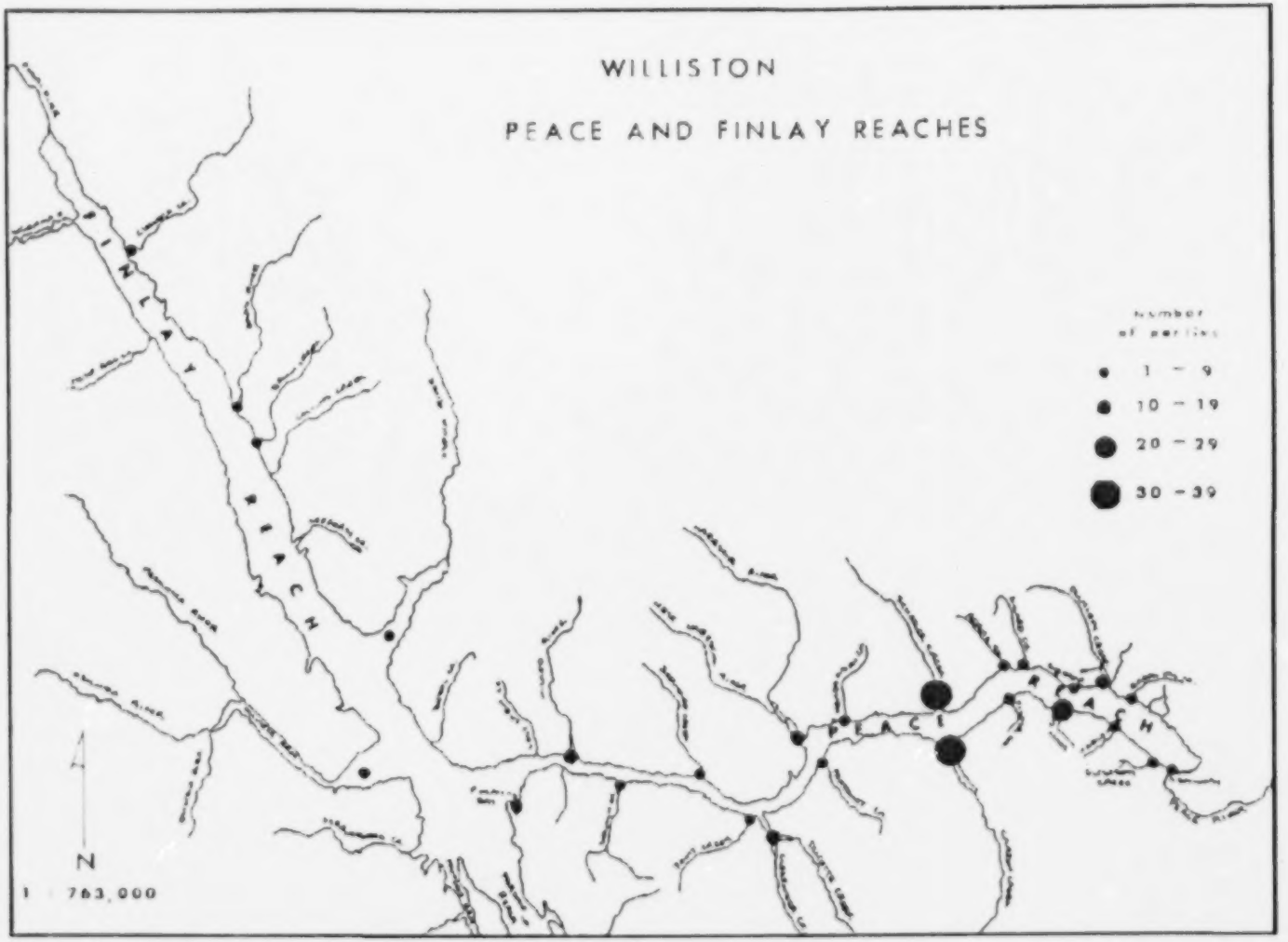


Figure 3. The concentrations of anglers interviewed during the Peace Reach creel study.

Table I - Number of anglers interviewed, angler hours and fish from the Peace Reach creel survey and the expanded estimates.

Category	Number Sampled	Estimated Total Number	95% C.I.
Number of anglers	323	1,186	±310
Angler Hours	1794	7,465	±3,575
Total number of fish caught	854	3,332	±1191
Total number of fish kept	548	2,135	±815
Rainbow trout caught	481	1,889	±845
Rainbow trout kept	326	1,278	±613
Bull trout caught	198	786	±477
Bull trout kept	107	447	±203
Kokanee caught	90	321	±189
Kokanee kept	72	242	±142
Arctic grayling caught	11	48	±37
Arctic grayling kept	5	22	±19
Whitefish caught	72	288	±178
Whitefish kept	36	146	±100

Table II - Fork lengths weights and condition factors of the fish sampled in the Peace Reach Creel Survey.

Species	FL(mm)	Weight (g)	Condition Factor	Sample Size	Weight Range (g)
RB	323	379	1.09	98	195 765
BT	442	1316	1.01	38	192 6010
KO	280	302	1.36	11	220 - 400
AG	324	375	1.12	2	350 - 400

FINLAY BAY CREEL SURVEY

ANGLERS

i) Number and Origin - A total of 62 parties with 225 people were interviewed. An additional 410 people (113 parties) were counted but not interviewed. Local anglers comprised 50.3% of the anglers interviewed, 9.6% were from other areas in B.C., 33.4% were Canadians outside B.C.(Primarily Alberta) and 6.7% were from the U.S.A.

The following gives use by the local anglers only:

Mackenzie	79.7%
Dawson Creek	7.1%
Fort St. John	5.3%
Chetwynd	4.4%
Hudson Hope	3.5%

ii) Hours Fished - The total angling hours was 2601.4 hours or 11.6 hours per trip for parties interviewed. The expanded total hours including the 410 people not interviewed was 7336.9 hours.

iii) Area Fished - Just over half of the anglers concentrated their fishing efforts within the Peace Reach with the remainder travelling into the Finlay Reach. No anglers that were

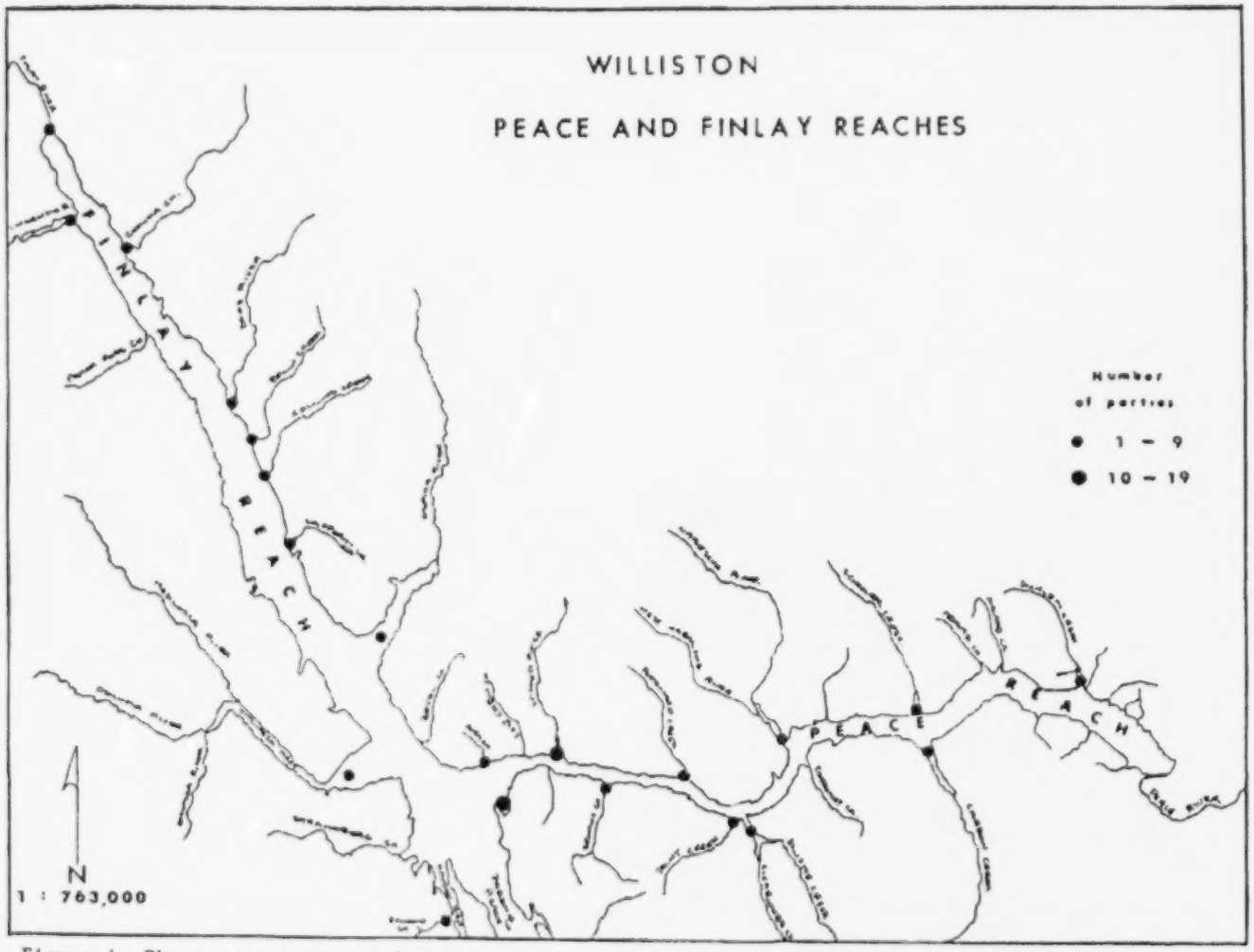


Figure 4. The concentrations of anglers interviewed during the Finlay Bay creel study.

interviewed fished the Parsnip Reach. Exact fishing locations, embayment, creek or reservoir were not noted. The distribution of anglers interviewed have been plotted on Figure 4 (see also Appendix II).

iv) Angling Method - The angling method was recorded on 51 creel cards. The results were as follows:

fly	3
spin casting	51
trolling	16

v) Species Preference - Species preference was noted on 33 creel cards and the results were as follows:

	First Choice	Second Choice
Bull trout	91%	9%
Rainbow trout	3%	91%
Peamouth chub	3%	
Arctic grayling	3%	
Mountain Whitefish		
	33 recorded	11 recorded

CATCH

i & ii) Numbers of fish by species caught and kept - Bull trout were the most abundant species caught by far. They were followed by rainbow trout, squawfish, Arctic grayling, mountain whitefish and finally kokanee:

	BT	RB	SQ	AG	WF	KO	TOTAL
Caught	632	92	29	4	4	1	762
Kept	275	52	20	4	4	1	356

B. C. HYDRO RECREATION SITE

Data collected during the three day survey has been summarised, along with the other studies, in Table III. The data cannot be considered representative as this weekend was the local fishing derby. Only the catch per unit effort figure (0.54 fish caught per hour) may be considered valuable in terms of being representative.

FLIGHT SURVEYS

Expanded estimates were determined for the entire reservoir from the flight surveys. A total of 275 parties were counted for an estimated angler count of 972. Sixty five percent of the parties observed were in the Peace Reach followed by 25% in the Parsnip and 10% in the Finlay Reach. Angler distribution by habitat type was 26% rivermouth or river, 35% embayment and 40% reservoir, although it was difficult to ascertain clear distinctions in many cases. On a reach by reach basis 63% of the parties observed in the Finlay reach were fishing the river mouths, 7% were in the embayments and 30% were in the reservoir. In the Parsnip Reach 68% of the anglers were noted as fishing in the embayments, 25 % at the rivermouth and 7% were in the reservoir. In the Peace Reach 54% of the anglers were fishing the reservoir, 26 % were in the embayments and 21 % at the rivermouth. Angler distribution has been plotted on three maps, figures 5 to 7 and has been listed in Appendix III.

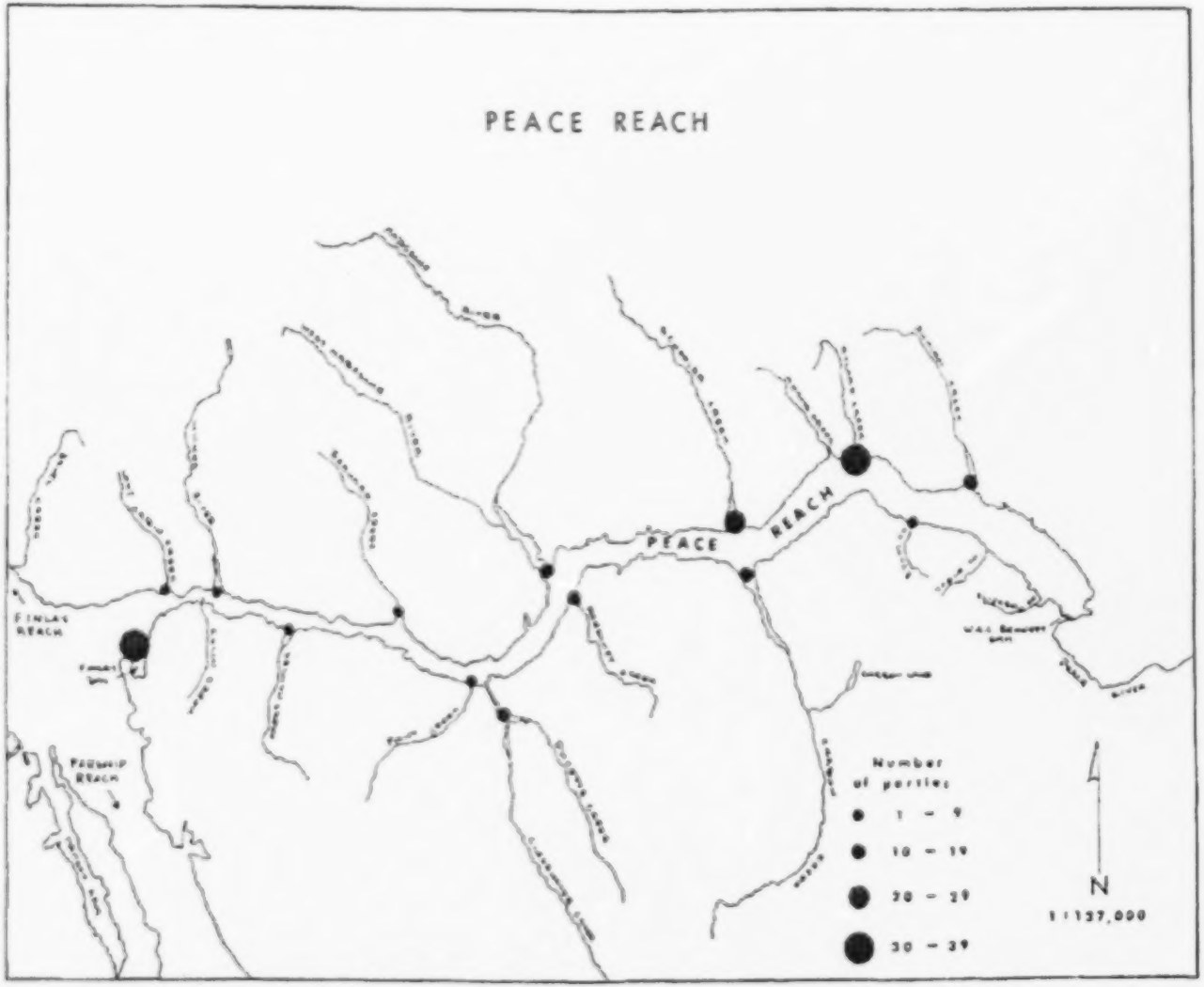


Figure 5. The concentrations of anglers counted in the Peace Reach during the flight surveys.

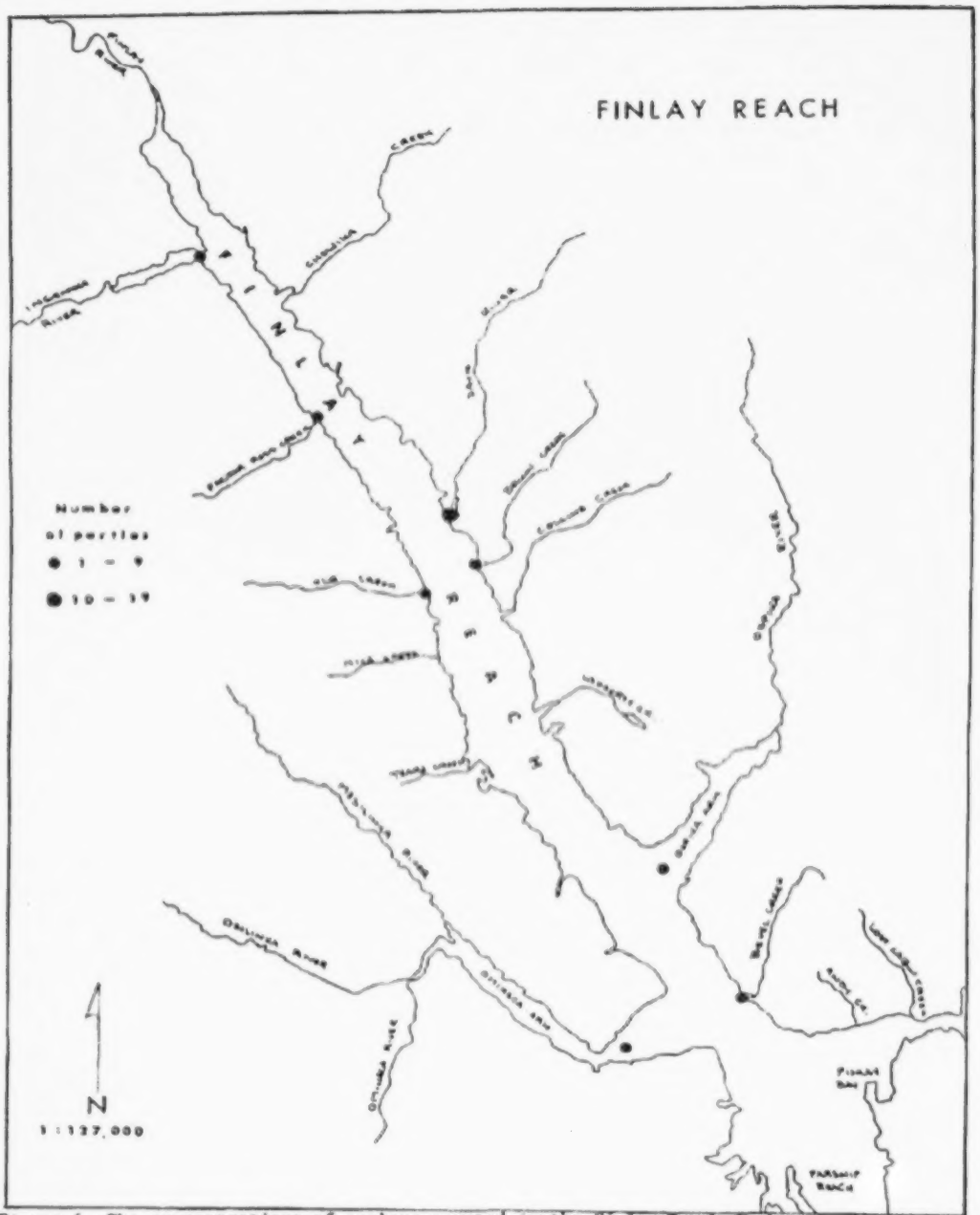


Figure 6. The concentrations of anglers counted in the Finlay Reach during the flight surveys.

Table III. Summary of Calculations from all Four Surveys.

	PEACE REACH	FINLAY BAY	MACKENZIE	FLIGHT SURVEYS
No. of parties interviewed	119	62	35	275
No. of anglers/party (average)	2.71	3.63	1.63	(3.17)*
No. of anglers (party est.)	323	225	57	972 ±279
Estimated no. anglers	**1186** ±310	**635**		**3081**
Hours/angler (average)	5.55	11.55	5.54	(8.55)*
Angling hours	1794	2601	316	26,342
Est., angling hours	7456 ±3575	7336		
Fish caught	854	762	172	
Fish kept	548	356	86	
Est. fish caught (using c/ue)	3332 ± 1191	2765		10,142
Est. fish kept (using c/ue)	2135 ± 815	1292		5,927
Catch per unit effort				
Fish caught/hour	0.48	0.29	0.54	
Fish kept/hour	0.31	0.14	0.27	
± = 95% C.I.				
Angler origin: Local	61.9%	50.3%	100%	
B.C	0.9%	9.6%		
Can. (Alberta)	37.2%	33.4%		
U.S.A.	0 %	6.7%		
Species preference: RB	53.8%	3.0%	25.0%	
BT	22.5%	91.0%	66.7%	
KO	19.2%	-	-	
AG	0.8	3.0%	-	
OS	4.1%	3.0%	8.3%	

( )* grouped data

DISCUSSION

SURVEY COMPARISONS

It is difficult to draw comparisons between the flight surveys and the ground based surveys from Finlay Bay and Dunlevy. The surveys covered different areas and were designed to provide different but complementary information. The flights were intended to provide comparisons of effort between reaches and to give an estimate of total use. The ground based surveys were intended to provide more detailed information about individual parties. Angler distribution based on the flight surveys could be misleading as many of the boats or ground based parties may not have been fishing at the time they were recorded. The 1977 surveys were ground based, but the locations were different that the 1989 surveys. One survey was conducted on the road to Finlay Bay rather than at Finlay Bay and the other survey was conducted near Dunlevy but may have interviewed anglers fishing in the rivers as well as the reservoir. There was no final report and information for this earlier creel is sketchy, other than final results (data on file).

There was some confusion or discrepancy over angler location. The Peace Reach survey recorded anglers as fishing in the river only if they hiked upstream from the river mouth. The creel flight surveys recorded anglers as fishing the river if they were within 100 m of the river mouth. In the Parsnip Reach, campsites are located in the embayments or on the reservoir. Unless these anglers were actually observed fishing at the rivermouth they were recorded as fishing in the area adjacent to their campsite (embayment). Personal observations suggest that more angler effort was directed to the rivermouth areas than the data indicates.

The creel clerk covering Finlay bay noted a reluctance to disclose information, therefore some of this data may be questionable. This was not the case from the Peace survey where a higher percentage of the anglers were local and many of the anglers from Alberta kept their boats at the Yacht Club. The data from the Peace Reach Survey should be considered to be the most reliable of the surveys.

None of these surveys would have given data on the fishing effort from logging camps and tree planting camps. These camps usually fly workers in and out and most angling occurs after normal working hours. It was felt that with the limited frequency of the creel flights additional effort to cover these groups was not economically possible. Angler effort from these camps can be quite high and could have an impact on local fisheries (B. Blackman pers obs).

The low numbers of anglers, huge area to cover and the nomadic nature of anglers using the reservoir makes accurate estimates of use extremely difficult.

ANGLER EFFORT

The number of anglers using the reservoir during the survey period was estimated to be 3081. This number appears to be rather low considering the size of the reservoir and the high angler success rates. In comparison with the 1977 survey (Table IV) the number of anglers using the Peace reach was down nearly 40% (2079 to 1186) although the creel methodologies are not necessarily comparable.

The Peace Reach was the most heavily fished area with 65% of the anglers, followed by the Parsnip and Finlay Reaches with 25% and 10% respectively. The total number of angler hours spent on the reservoir was estimated at 26,300, with an average of 8.55 angler hours per trip. The reason for this exceptionally high number of hours per trip is the number of overnight and weekend trips. Access to most of the fishing areas is by boat only. Because of the dangerous and unpredictable nature of the reservoir, most anglers have well equipped, larger boats and tend to camp near the river mouths. Small boats are used primarily in small, protected embayments with launching facilities.

Table IV Summary of the 1977 and 1989 Creel Survey Results (taken from an unpublished M.O.E. report +1989 data)

		No. of Anglers	Angler Hours	No. of Fish	C.U.E
Peace Reach	1977	2079 ± 228	9678 ± 1520	4114 ± 827	0.42
*	1989	1186 ± 310	7457 ± 3575	2135 ± 815	0.31
Finlay Forks**	1977	1054 ± 3955	4129 ± 569	1656 ± 251	0.40
Pack Road (Parsnip)	1977	473 ± 70	2348 ± 424	727 ± 123	0.31

* from the 1989 Dunlevy based survey.
**Finlay Forks road survey would have included a significant portion of effort in the Parsnip Reach and would not be comparable to the Finlay Bay location. The exact location of the 1977 Peace Reach survey was unclear.

ANGLER ORIGIN

The 1989 Peace survey found 62% of the anglers were local and 37% were from Alberta. Many of the anglers from Alberta keep boats at the Yacht Club, which was at the time of the survey, the primary access point to the reservoir for boaters. The high percentage of anglers from Alberta is possibly due to limited fishing opportunities locally, particularly for trout. These anglers consider Williston Reservoir as local.

The breakdown of anglers interviewed from the Finlay Bay survey was 50% local, 33% non B.C. Canadians (Alberta), 9.6% from other areas

of B.C. and 6.7% from the U.S.A. Limited use from non local fishermen is partially due to the reservoirs reputation as being dangerous, (frequent storms, and floating debris) and the lack of boat launch facilities for the larger boats required for the open waters in the reservoir.

	Local	B.C.	Canada (Alberta)	Other
Dunlevy	62	1	37	0
Finlay Bay	50	10	33	7

AREA FISHED

It is difficult to give exact figures on use because of confusion over boundaries between reservoir, embayment and rivermouth. Anglers often stop and fish at a rivermouth for a short period of time, fishing from shore, hiking short distances up the stream, and fishing from the boat or trolling in the embayment near the rivermouth, and then move to the next stream mouth. This makes determining use from the aeroplane difficult i.e. boats perceived as travelling between fishing locations were counted as angling but were recorded as in the reservoir. Much of the fishing is conducted during trips that may last for several days. Estimates of how much time was spent angling at different locations could be suspect.

Angler use, based on the creel flight data, indicates that the Peace Reach anglers fished primarily in the reservoir (54%) and the embayments (26%). The Dunlevy creel survey found a different angler use in the Peace Reach with 69% of the effort in the embayments, 29% in the reservoir and only 2 % in the rivers. As mentioned earlier part of this discrepancy is a result of confusion over boundaries between the fishing areas.

The creel flights indicate that in the Finlay Reach 63% of the anglers fished the river mouths. Personal observations suggest nearly all the fishing in the Finlay Reach is at rivermouths. Based on the creel flights for the Parsnip Reach, 68% of the angling was in the embayments only 25% of the effort was at the river mouths.

ANGLING METHOD

Both spin casting and trolling were equally popular in the Peace Reach survey but spin casting was by far the most popular in the Finlay Bay survey. Very few people fly fished.

SPECIES PREFERENCE

Just over half of the Peace anglers interviewed preferred rainbow trout. The remainder was spilt between bull trout and kokanee. The Finlay Bay anglers (91%) preferred bull trout, with the remaining 9% divided among rainbow trout, Arctic grayling and other species.

Angler preference may be a better measure of expectation rather than preference. Public meetings held in local communities (Becker 1992) shows a high preference for Arctic grayling, but this species is now virtually extinct in the reservoir and river mouth areas.

CATCH

Rainbow trout made up 59.5% of the Peace catch. Bull trout comprised 19.5% and kokanee an additional 10%. The remainder included Arctic grayling and whitefish. The Finlay Bay catch included 83% bull trout and 12% Rainbow Trout. The remainder included whitefish, coarse fish, Arctic grayling and kokanee.

This is a significant change from the 1977 survey results where Arctic grayling made up 58% of the Peace Reach creel and 23 % of the Finlay Bay catch. The decline in grayling has resulted in increased pressure on rainbow trout, primarily in the Peace Reach and bull trout in the Finlay and Parsnip Reaches.

Kokanee now constitute 13% of the creel in the Peace Reach and interest in the species is increasing.

The catch per unit effort has remained relatively high since the 1977 surveys. The catch per unit effort in 1977 for the Peace Reach was 0.42 fish/hr and 0.40 for the Finlay Forks Area. In 1989 the C.P.U.E. was estimated at 0.47 fish per angler hour in the Peace Reach and 0.29 at Finlay Bay. These estimates may be somewhat misleading in that anglers are now travelling to more remote areas and success rates in the more accessible locations have declined (B. Blackman pers obs).

Table V. Creel Species Composition 1977 vs 1989

		RB %	AG%	BT%	WF%	KO%
Peace	1977	25.1	57.5	8.2	9.2	-
Reach	1989	59.5	0.9	19.5	6.9	13.0
Finlay	1977	28.3	23.0	37.2	12.0	-
Reach	1989	14.6	1.1	77.2	6.7	0.3

This data indicates the numbers of bull trout in the creel have doubled, in comparison to the 1977 surveys. Arctic grayling and mountain whitefish numbers have been greatly reduced. Rainbow trout success appears to have dropped in the Finlay Reach while the catch has increased in the Peace Reach. The high rainbow trout harvest in the Peace Reach may be a product of angler pressure rather than abundance. Reservoir netting studies conducted in 1988 (Blackman 1992) indicate that the relative abundance of rainbow trout has decreased (from 7.6 to 3.0 % of the total catch) since 1974-5 and that in the Peace Reach there were few rainbow trout in the older age

BULLTROUT LENGTH FREQUENCY
BY AGE CLASS

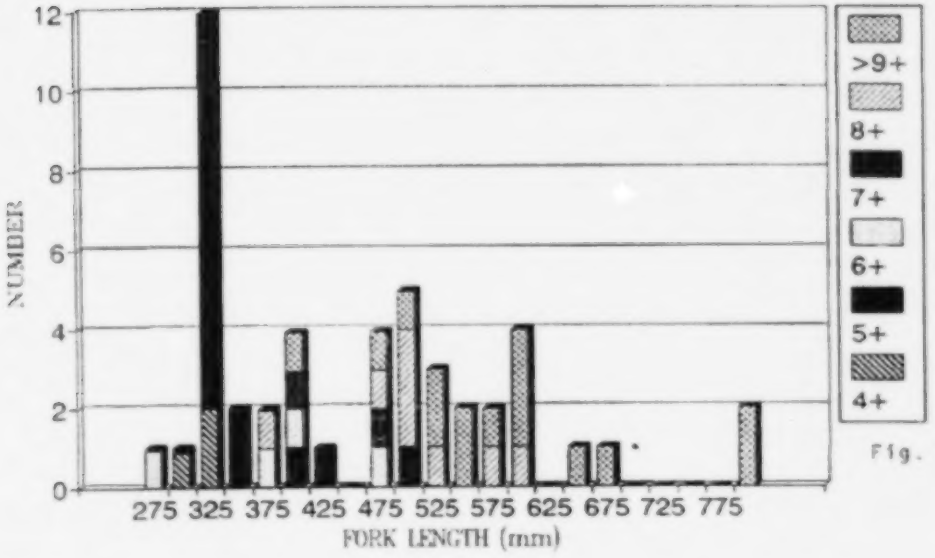


Fig. 8

RAINBOW TROUT LENGTH FREQUENCY
BY AGE CLASS

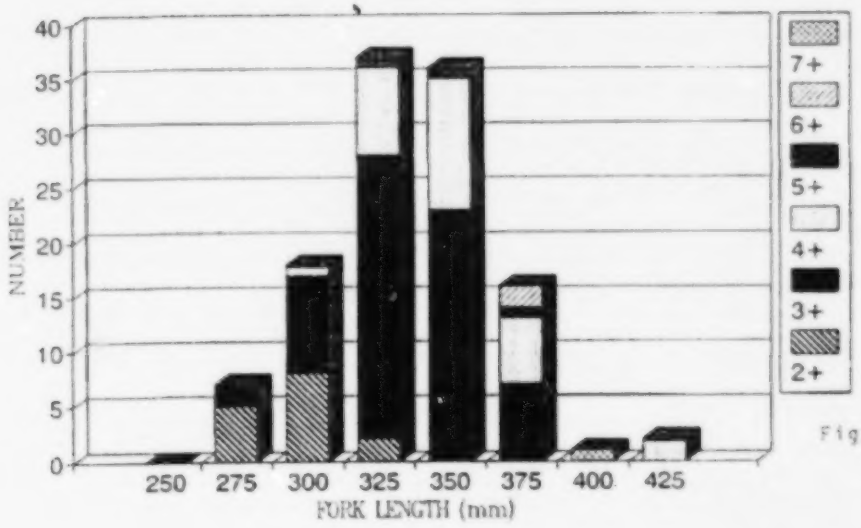


Fig. 9

classes. This lack of older fish could be because of behavioural patterns but could also be a sign of over fishing.

The kokanee catch in the Peace is becoming increasingly more important particularly in light of the fact that no kokanee were reported in 1977.

The growth rates of the bull trout sampled during the creel do not appear to have changed since the gill netting surveys conducted in 1974-5 (Barrett and Halsey 1985) and 1988 (Blackman 1992). However this is inconclusive because of the highly variable growth rates, small sample size and sampling bias associated with a creel survey (Fig 8 & 9, Appendix IV).

Rainbow trout size at age has decreased since 1974-5 both in the creel and in the 1988 netting program. All age classes are larger in the reservoir and creel in comparison to stream growth rates (Table VI).

Table VI Rainbow Trout Size at Age

	Creel 1989			Reservoir 1988			Reservoir 1974			Rivers 1992		
Age	FL mm	Stdev	No.	FL mm	Stdev	No	FL mm	Stdev	No.	Fl mm	Stdev	No.
1				223	20	7	237	24	24	107	22	78
2	283	13	15	278	28	27	274	33	29	206	37	24
3	322	21	67	318	28	47	339	34	38	254	42	51
4	339	27	29	356	24	16	382	23	39	297	35	35
5	342	15	3	376	5	3	413	17	17	347	35	7

CONCLUSIONS

Angler effort on the reservoir is very low. This could be attributed in part to limited access and low populations densities in the north. On this large and potentially dangerous reservoir large seaworthy craft are a must. Launching large craft can be a major obstacle because of the limited number of boat launches, most of which are drastically affected by fluctuating water levels.

Floating debris was a major boating hazard but this has been cleaned up. There are still areas with submerged timber that may or may not be exposed depending on the water levels but these areas are also being cleaned up. The standing timber is most prevalent in the Finlay Reach or embayment areas, where boaters would seek shelter from the frequent and sudden storms.

Many of the more accessible areas may have been overfished. For example the rivers were at one time extremely popular fishing areas but surveys during the summer of 1989 found many accessible rivers virtually barren of fish (Blackman 1993). Rainbow trout stocks in the Peace Reach have few fish in the older age classes a possible sign of overfishing (Blackman 1992). The catch per unit effort for bull trout for anglers fishing out of Dunlevy was 0.11 fish per hour in

comparison to 0.24 fish per hour from the less heavily utilized areas accessed from Finlay Bay.

It may be necessary to reduce the harvest of bull trout, in the river and embayment fisheries in order to maintain viable local populations.

There are limited opportunities for "Sunday" boaters to take the family out fishing on the reservoir itself.

Ninety nine percent of the anglers interviewed during the Dunlevy survey were local or from Alberta (they consider themselves local) compared to 83% from the same groups at the Finlay Bay site. Undoubtedly the main reason for the lack of outside anglers is the reputation of the reservoir as dangerous and the lack of suitable launch facilities. In order for this reservoir to attract a greater number of anglers the fishing will have to improve dramatically, launching facilities for larger boats will have to be improved and the fisheries and access to the sheltered embayments will have to be improved.

Most angling effort is concentrated at the rivermouths or in the protected embayments. This could be attributed to the concentrations of fish in these areas, traditional fishing patterns, as well as the safety factor.

Species preferences are difficult to assess in that anglers may be stating what they expect to catch rather than what they want to catch. It should also be noted that anglers specifically fishing for larger bull trout are unlikely to catch rainbow trout (B. Blackman pers observation) and vice versa. Therefore the perceived target may be very important in determining catch. None the less, it is obvious that the anglers in the Peace Reach have very different preferences that the rest of the reservoir. Bull trout play a less important role in the Peace Reach and kokanee may, in the not too distant future, become much more important.

One unfortunate result of the creel survey design is the limited amount of information on the Parsnip Reach. This area has relatively good access and is reasonably convenient for small craft boaters. Angler effort at the stream mouths and embayments can be very high particularly in early July when the river fisheries open.

The low numbers of anglers, the large distances covered and the remoteness of some of the areas, make gathering reliable creel information on the reservoir very difficult and expensive. The rapidly developing road networks along the Parsnip and Finlay Reaches, development of new boat launch facilities and recreation sites and movements of logging and mining exploration camps result in constantly changing angler patterns, which make comparisons between different years difficult.

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Appendix I - The distribution of anglers interviewed during the Peace Reach Creel.

SYSTEM	BAY	LAKE	RIVER	TOTAL
Spillway		9		9
Elizabeth	1			1
Table	7	6		13
Gravel Hill	1			1
Dunlevy	11	3		14
Stott	12	12		24
Goldbar		4		4
Aylard		3		3
Adams	6	2		R
Fisher	6	2		8
Carbon	28	7	2	37
Schooler	23	10	1	34
Henderson	3			3
Pardonet	2			2
Nabesche	14	2		16
Clearwater	13	2	1	16
Point	5			5
Bernard	3			3
Selwyn	4			4
Wicked	11			11
Finlay Bay	3			3
Ospika	4			4
Bruin	1			1
Davis	3			3
Chowika	1			1
Omineca	2			2
	164	62	4	230
	71.3	27.0%	1.7%	

Appendix II - The distribution of anglers interviewed during the Finlay Bay Creel.

SYSTEM	PERCENT ANGLER USE
Finlay Bay	19
Omineca	1
Ospika	7
Lafferty	1
Collins	5
Bruin	1
Davis	3
Chowika	1
Ingenika	3
Finlay River	4
Ecklund	1
Andy	1
Lost Cabin	1
Wicked	17
Selwyn	6
Bernard	6
Clearwater	6
Point	6
Nabesche	3
Carbon	3
Schooler	3
Dunlevy	3

APPENDIX III

CREEL FLIGHT SUMMARY

DUNLEVY CREEL FISH SAMPLES

DATE19 89

A	SA NO	SP CD	F.L. mm	WT. gms	SEX	AGE	Md	CAPT METH	DAY	MO	LAKE CD	COMMENTS
D	157	AG	298		16			CR	16	7	WILLI1	TABLE/CARBON BAYS
D	222	AG	307	350	6	3	SC	CR	30	7	WILLI1	EMBAMENT- STOT CR
D	110	AG	340	400	6	4	SC	CR	5	7	WILLI1	EMBAYMENT WICKED
D	147	BT	482					CR	14	7	WILLI1	EMBAMNTS FINLAY RCH
D	148	BT	640					CR	14	7	WILLI1	EMBAMNTS FINLAY RCH
D	144	BT	690					CR	14	7	WILLI1	EMBAMNTS FINLAY RCH
D	149	BT	420					CR	14	7	WILLI1	EMBAMNTS FINLAY RCH
D	145	BT	620					CR	14	7	WILLI1	EMBAMNTS FINLAY RCH
D	146	BT	667					CR	14	7	WILLI1	EMBAMNTS FINLAY RCH
D	177	BT	278	192				CR	17	7	WILLIO	SCHOOLER "
D	384	BT	289	195				CR	29	8	WILLI1	DUNLEVY CK MOUTH
D	383	BT	308	220				CR	29	8	WILLI1	DUNLEVY CK MOUTH
D	57	BT	610	2835	6			CR	23	6	WILLI1	STOT LK OR SCHLR BY
D	58	BT	711	3742	16			CR	23	6	WILLI1	STOT LK OR SCHLR BAY
D	59	BT	686	3856	16			CR	23	6	WILLI1	STOT LK OR SCHLR BAY
D	135	BT	302	215	16	4	OT	CR	13	7	WILLI1	EMBAY CARB/SCHOOLER
D	100	BT	290	250		4	OT	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	354	BT	317	260		4	OT	CR	20	8	WILLI1	EMBAYMENT CARBON
D	99	BT	310			5	OT	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	2	BT	310			5	OT	CR	30	5	WILLI1	EMBAY DUNLEVY
D	102	BT	305	235	99	5	OT	CR	1	7	WILLI1	EMBAYMENT DUNLEVEY
D	387	BT	314	270	16	5	SC	CR	3	9	WILLI1	EMBAYMENT HENDERSON
D	6	BT	314	270	16	5	OT	CR	10	6	WILLI1	EMBAY RGRAVEL HL
D	355	BT	310	280		5	OT	CR	20	8	WILLI1	EMBAYMENT CARBON
D	356	BT	331	315	16	5	OT	CR	20	8	WILLI1	EMBAYMENT CARBON
D	98	BT	322	320		5	OT	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	353	BT	322	320		5	OT	CR	20	8	WILLI1	EMBAYMENT CARBON
D	158	BT	339	370	6	5	OT	CR	16	7	WILLI1	TABLE/CARBON BAYS
D	382	BT	400	590		5	OT	CR	29	8	WILLI1	DUNLEVY CK MOUTH
D	334	BT	273			6	OT	CR	13	8	WILLI1	EMBAYMENT NABESCHE
D	223	BT	352	400	16	6	OT	CR	30	7	WILLI1	EMBAMENT- STOT CR
D	388	BT		435		6	OT	CR	4	9	WILLI1	EMBAYMENT CLWR
D	371	BT	377	530	16	6	OT	CR	27	8	WILLI1	EMBAYMENT CARBON
D	348	BT	474	1460	6	6	OT	CR	20	8	WILLI1	EMBAYMENT CARBON
D	305	BT	456			7	OT	CR	7	8	WILLI1	EMBAYMENT LOST CABIN
D	335	BT	321			7	OT	CR	13	8	WILLI1	EMBAYMENT NABESCHE
D	310	BT	305	260		7	OT	CR	7	8	WILLI1	EMBAYMENT SCHOOLER
D	308	BT	378	510	6	7	OT	CR	7	8	WILLI1	EMBAYMENT SCHOOLER
D	97	BT	412	620	6	7	OT	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	349	BT	487	1250	6	7	OT	CR	20	8	WILLI1	EMBAYMENT CARBON
D	234	BT	500			8	OT	CR	30	7	WILLI1	BAY POINT/NABESCHE
D	143	BT	500			8	OT	CR	14	7	WILLI1	ENBAMNTS FINLAY RCH
D	163	BT	561			8	OT	CR	16	7	WILLI1	STOTT CLWR BAYS
D	3	BT	480		6	8	OT	CR	30	5	WILLI1	EMBAY DUNLVEY
D	178	BT	508			8	OT	CR	20	7	WILLI1	EMBMNTS OSPICA-CLWR
D	307	BT	372	575	6	8	OT	CR	7	8	WILLI1	EMBAYMENT SCHOOLER
D	74	BT	465	1070	16	8	OT	CR	24	6	WILLI1	EMBAYMENT SCHOOLER
D	374	BT	591	3000	16	8	OT	CR	27	8	WILLI1	EMBAYMENT CARBON
D	304	BT	582			9	OT	CR	7	8	WILLI1	EMBAYMENT WICKED

DUNLEVY CREEL FISH SAMPLES

A	SA NO	SP CD	F.L. mm	WT. gms	SEX	AGE	Md	CAPT METH	DAY	MO 19 89	LAKE	CA CD	COMMENTS
D	235	BT	526			9	OT	CR	30	7	WILLI	1	BAY POINT/NABESCHE
D	309	BT	384	520		9	OT	CR	7	8	WILLI	1	EMBAYMENT SCHOOLER
D	96	BT	494	1120	6	9	OT	CR	25	6	WILLI	1	BAYS PNT/SCHLR/NAB
D	292	BT	470	1200	6	9	OT	CR	6	8	WILLI	1	EMBAYMENT CLWR
D	111	BT	512	1220	16	9	OT	CR	5	7	WILLI	1	EMBAYMENT CLWR
D	291	BT	545	2200	6	9	OT	CR	6	8	WILLI	1	EMBAYMENT NABESCHE
D	312	BT	635	2325		9	OT	CR	11	8	WILLI	1	EMBAYMENT CLWR
D	233	BT	511			10	OT	CR	30	7	WILLI	1	BAY POINT/NABESCHE
D	4	BT	570		16	10	OT	CR	30	5	WILLI	1	EMBAY DUNLEVEY
D	364	BT	590	2600	16	10	OT	CR	25	8	WILLI	1	EMBAYMENT CARBON
D	306	BT	825	6010	6	10	OT	CR	7	8	WILLI	1	EMBAYMENT WICKED
D	150	BT	671		16	11	OT	CR	14	7	WILLI	1	CLWR RIV
D	134	BT	600	2500	6	11	OT	CR	13	7	WILLI	1	EMBAY CARB/SCHOOLER
D	104	BT	777	5897	16	12	OT	CR	3	7	WILLI	1	EMBAYMENT PARDONETT
D	82	KO	287			2	SC	CR	25	6	WILLI	1	EMBAYEMENT TABLE
D	115	KO	255	220	16	2	SC	CR	8	7	WILLI	1	EMBAYMT STOTT TABLE
D	300	KO	283	320	6	2	SC	CR	7	8	WILLI	1	LKSHR TABLE STOTT
D	239	KO	268		6	3	SC	CR	30	7	WILLI	1	LAKE ADAMS
D	255	KO	267	280		3	SC	CR	2	8	WILLI	1	EMBY SCHOOLER/CARBON
D	393	KO	275	295		3	SC	CR	7	8	WILLI	1	EMBAYMENT STOTT
D	259	KO	283	300		3	SC	CR	2	8	WILLI	1	EMBY SCHOOLER/CARBON
D	301	KO	287	310		3	SC	CR	7	8	WILLI	1	EMBAYMENT ELIZABETH
D	277	KO	282	320	6	3	SC	CR	6	8	WILLI	1	LAKESHORE NR SCHLR
D	276	KO	282	320	6	3	SC	CR	6	8	WILLI	1	LAKESHORE NR SCHLR
D	392	KO	294	350		3	SC	CR	7	8	WILLI	1	LKSHR WEST OF TABLE
D	376	KO	279	280	13	4	SC	CR	27	8	WILLI	1	LAKE OUT FR SCHOOLER
D	377	KO	282	285	13	4	SC	CR	27	8	WILLI	1	LAKE OUT FR SCHOOLER
D	365	KO	304	400	3	4	SC	CR	27	8	WILLI	1	LKSHR EAST SCHOOLER
D	220	LING	373	530		8	OT	CR	30	7	WILLI	1	EMBAMENT- STOT CR
D	176	RB	350	560			SC	CR	17	7	WILLI	0	SCHOOER CR #B2P4 #8
D	352	RB	271	230	R		SC	CR	20	8	WILLI	1	EMBAYMENT CARBON
D	224	RB	286	260	16 R		SC	CR	30	7	WILLI	1	EMBAMENT- SCHOOLER
D	229	RB	350	450	16 R		SC	CR	30	7	WILLI	1	EMBAYMENT- SCHOOLER
D	372	RB	281		16	2	SC	CR	27	8	WILLI	1	EMBAYMENT CARBON
D	238	RB	282			2	SC	CR	30	7	WILLI	1	EMBAYMENT ADAMS
D	333	RB	310			2	SC	CR	13	8	WILLI	1	EMBAYMENT NABESCHE
D	330	RB	275			2	SC	CR	13	8	WILLI	1	EMBAYMENT NABESCHE
D	114	RB	263	190	16	2	SC	CR	8	7	WILLI	1	EMBAYMNT STOTT TABLE
D	370	RB	266	195		2	SC	CR	27	8	WILLI	1	LKSHR EAST SCHOOLER
D	290	RB	270	215		2	SC	CR	6	8	WILLI	1	EMBAYMENT SCHOOLER
D	278	RB	271	225	6	2	SC	CR	6	8	WILLI	1	EMBAYMT SCHLR HENDRS
D	299	RB	277	255	6	2	SC	CR	7	8	WILLI	1	LKSHR TABLE STOTT
D	131	RB	294	260	6	2	SC	CR	13	7	WILLI	1	EMBY CARB/SCHOOLER
D	228	RB	291	260	6	2	SC	CR	30	7	WILLI	1	EMBAYMENT- SCHOOLER
D	279	RB	282	265	6	2	SC	CR	6	8	WILLI	1	EMBAY SCHLR HENDRS
D	275	RB	285	270		2	SC	CR	6	8	WILLI	1	LAKESHORE NR SCHLR
D	285	RB	290	295	6	2	SC	CR	6	8	WILLI	1	LKSHR EAST OF CARBON
D	113	RB	305	315	16	2	SC	CR	8	7	WILLI	1	EMBAY STOTT TABLE

DUNLEVY CREEL FISH SAMPLES

A	SA NO	SP CD	F.L. mm	WT. gms	SEX	AGE	Md	CAPTMETH	DATE DAY	MO	LAKE CD	COMMENTS
									19	89		
D	328	RB	337			3	SC	CR	13	8	WILLI1	EMBAYMENT NABESCHE
D	232	RB	360			3	SC	CR	30	7	WILLI1	BAY POINT/NABESCHE
D	167	RB	300			3	SC	CR	16	7	WILLI1	STOTT CLWR BAYS
D	132	RB	334			3	SC	CR	13	7	WILLI1	EMBAY CARB/SCHOOLER
D	133	RB	344			3	SC	CR	13	7	WILLI1	EMBAY CARB/SCHOOLER
D	164	RB	334			3	SC	CR	16	7	WILLI1	STOTT CLWR BAYS
D	231	RB	340			3	SC	CR	30	7	WILLI1	BAY POINT/NABESCHE
D	83	RB	340			3	SC	CR	25	6	WILLI1	EMBAYMENT TABLE
D	161	RB	337			3	SC	CR	16	7	WILLI1	STOTT SCHOOLER BAYS
D	329	RB	310			3	SC	CR	13	8	WILLI1	EMBAYMENT NABESCHE
D	237	RB	309			3	SC	CR	30	7	WILLI1	EMBAYMENT ADAMS
D	162	RB	345			3	SC	CR	16	7	WILLI1	STOTT SCHOOLER BAYS
D	332	RB	299			3	SC	CR	13	8	WILLI1	EMBAYMENT NABESCHE
D	101	RB	275	235		3	SC	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	226	RB	286	250	6	3	SC	CR	30	7	WILLI1	EMBAYMENT- SCHOOLER
D	103	RB	285	275	16	3	SC	CR	1	7	WILLI1	LAKE SHORE NR STOTT
D	367	RB	302	280	6	3	SC	CR	27	8	WILLI1	LKSHR E. OF SCHOOLER
D	244	RB	275	290	6	3	SC	CR	30	7	WILLI1	
D	120	RB	308	295	16	3	SC	CR	8	7	WILLI1	LAKE SHORE SCHOOLER
D	389	RB	298	300	16	3	SC	CR	4	9	WILLI1	EMBAYMENT CARB CLWRT
D	381	RB	302	300	16	3	SC	CR	29	8	WILLI1	LKSHR ADAMS RB RCKS
D	317	RB	295	300	16	3	SC	CR	11	8	WILLI1	LKSHR TABLE STOTT
D	240	RB	304	310	16	3	SC	CR	30	7	WILLI1	EMBAYMENT STOTT
D	288	RB	307	310	16	3	SC	CR	6	8	WILLI1	LKSHR PAST DUNL INL
D	282	RB	320	315	14	3	SC	CR	6	8	WILLI1	LKSHR EAST OF CARBON
D	117	RB	314	315	6	3	SC	CR	8	7	WILLI1	LAKE SHORE SCHOOLER
D	85	RB	300	320	16	3	SC	CR	25	6	WILLI1	EMBAYMENT TABLE
D	385	RB	309	320		3	SC	CR	29	8	WILLI1	DUNLEVY CK MOUTH
D	88	RB	322	320	6	3	SC	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	122	RB	315	320	6	3	SC	CR	8	7	WILLI1	LAKE SHORE SCHOOLER
D	221	RB	320	325	14	3	SC	CR	30	7	WILLI1	EMBAMENT- STOT CR
D	316	RB	307	330	16	3	SC	CR	11	8	WILLI1	LKSHR TABLE STOTT
D	257	RB	320	335		3	SC	CR	2	8	WILLI1	EMBY SCHOOLER/CARBON
D	360	RB	294	335		3	SC	CR	25	8	WILLI1	EMBAYMENT CARBON
D	368	RB	298	335	16	3	SC	CR	27	8	WILLI1	LKSHR E. OF SCHOOLER
D	245	RB	317	340	14	3	SC	CR	30	7	WILLI1	
D	227	RB	320	350	6	3	SC	CR	30	7	WILLI1	EMBAYMENT- SCHOOLER
D	243	RB	316	350	16	3	SC	CR	30	7	WILLI1	
D	109	RB	314	350	16	3	SC	CR	5	7	WILLI1	BAYS WICKD/CLWR
D	89	RB	330	350	6	3	SC	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	225	RB	329	350	6	3	SC	CR	30	7	WILLI1	EMBAYMENT- SCHOOLER
D	390	RB	333	355	16	3	SC	CR	9	9	WILLI1	EMBAYMENT HENDERSON
D	286	RB	317	355	16	3	SC	CR	6	8	WILLI1	LKSHR EAST OF CARBON
D	108	RB	348	360	16	3	SC	CR	5	7	WILLI1	BAYS WICKD/CLWR
D	362	RB	321	370	16	3	SC	CR	25	8	WILLI1	EMBAYMENT CARBON
D	298	RB	327	370	16	3	SC	CR	7	8	WILLI1	LKSHR TABLE STOTT
D	280	RB	322	375	16	3	SC	CR	6	8	WILLI1	EMBAYMENT STOTT
D	241	RB	321	375	16	3	SC	CR	30	7	WILLI1	

DUNLEVY CREEL FISH SAMPLES

A	SA NO	SP CD	F.L. mm	WT. gms	SEX	AGE	Md	CAPT METH	DAY	MO	LAKE CD	CACOMMENTS
									19	89		
D	105	RB	305	380	6	3	SC	CR	3	7	WILLI1	BAYS CLWR TO ADAMS
D	160	RB	328	390	16	3	SC	CR	16	7	WILLI1	STOTT SCHOOLER BAYS
D	303	RB	330	400		3	SC	CR	7	8	WILLI1	LKSHR WEST OF TABLE
D	361	RB	338	400	14	3	SC	CR	25	8	WILLI1	EMBAYMENT CARBON
D	315	RB	332	400	16	3	SC	CR	11	8	WILLI1	LKSHR TABLE STOTT
D	283	RB	330	400	16	3	SC	CR	6	8	WILLI1	LKSHR EAST OF CARBON
D	366	RB	333	410	6	3	SC	CR	27	8	WILLI1	LKSHR E. OF SCHOOLER
D	281	RB	327	415	16	3	SC	CR	6	8	WILLI1	EMBAY SCHLR HENDRS
D	242	RB	330	425	16	3	SC	CR	30	7	WILLI1	
D	351	RB	320	445	16	3	SC	CR	20	8	WILLI1	EMBAYMENT CARBON
D	293	RB	349	450		3	SC	CR	6	8	WILLI1	EMBAY ADMS SCHOOLER
D	350	RB	325	455	6	3	SC	CR	20	8	WILLI1	EMBAYMENT CARBON
D	363	RB	341	455	16	3	SC	CR	25	8	WILLI1	EMBAYMENT CARBON
D	314	RB	354	475	16	3	SC	CR	11	8	WILLI1	LKSHR TABLE STOTT
D	386	RB	356	490	14	3	SC	CR	3	9	WILLI1	EMBAYMENT HENDERSON
D	106	RB	361	490	14	3	SC	CR	5	7	WILLI1	BAYS WICKD/CLWR
D	128	RB	370	530	6	3	SC	CR	13	7	WILLI1	EMBAY CARB/SCHOOLER
D	359	RB	358	530	6	3	SC	CR	25	8	WILLI1	EMBAYMENT CARBON
D	124	RB	355	550	6	3	SC	CR	8	7	WILLI1	LAKE SHORE SCHOOLER
D	236	RB	345			4	SC	CR	30	7	WILLI1	EMBAYMENT ADAMS
D	165	RB	334			4	SC	CR	16	7	WILLI1	STOTT CLWR BAYS
D	327	RB	357			4	SC	CR	13	8	WILLI1	EMBAYMENT NABESCHE
D	166	RB	302			4	SC	CR	16	7	WILLI1	STOTT CLWR BAYS
D	130	RB	280	270	16	4	SC	CR	13	7	WILLI1	EMBAY CARB/SCHOOLER
D	112	RB	317	275	14	4	SC	CR	8	7	WILLI1	EMBAY STOTT TABLE
D	369	RB	325	285	6	4	SC	CR	27	8	WILLI1	LKSHR E. OF SCHOOLER
D	378	RB	304	300	6	4	SC	CR	27	8	WILLI1	LAKE OUT FR SCHOOLER
D	260	RB	315	335		4	SC	CR	2	8	WILLI1	EMBY SCHOOLER/CARBON
D	256	RB	325	350		4	SC	CR	2	8	WILLI1	EMBY SCHOOLER/CARBON
D	121	RB	336	375	16	4	SC	CR	8	7	WILLI1	LAKE SHORE SCHOOLER
D	246	RB	326	375	16	4	SC	CR	30	7	WILLI1	
D	119	RB	328	380	16	4	SC	CR	8	7	WILLI1	LAKE SHORE SCHOOLER
D	375	RB	324	380	16	4	SC	CR	27	8	WILLI1	EMBAYMENT CARBON
D	302	RB	320	385		4	SC	CR	7	8	WILLI1	EMBAYMENT STOTT
D	116	RB	345	390	14	4	SC	CR	8	7	WILLI1	LAKE SHORE SCHOOLER
D	373	RB	326	400	6	4	SC	CR	27	8	WILLI1	EMBAYMENT CARBON
D	129	RB	340	415	6	4	SC	CR	13	7	WILI 1	EMBAY CARB/SCHOOLER
D	5	RB	358	420	8	4	SC	CR	4	6	WILLL1	EMBAY DUNLEVEY
D	84	RB	337	420	16	4	SC	CR	25	6	WILLI1	EMBAYMENT STOTT
D	123	RB	336	420	16	4	SC	CR	8	7	WILLI1	LAKE SHORE SCHOOLER
D	73	RB	349	440	6	4	SC	CR	24	6	WILLI1	EMBAYMENT SCHOOLER
D	107	RB	351	450	14	4	SC	CR	5	7	WILLI1	BAYS WICKD/CLWR
D	391	RB	338	455	6	4	SC	CR	9	9	WILLI1	EMBAYMENT HENDERSON
D	284	RB	365	505	6	4	SC	CR	6	8	WILLI1	LKSHR EAST OF CARBON
D	287	RB	357	510		4	SC	CR	6	8	WILLI1	LKSHR PAST DUNL INL
D	294	RB	360	550		4	SC	CR	6	8	WILLI1	EMBAY ADMS SCHOOLER
D	86	RB	404	720	6	4	SC	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	87	RB	416	820	16	4	SC	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB

DUNLEVY CREEL FISH SAMPLES

A	SA NO	SP CD	F.L. mm	WT. gms	SEX	AGE	Md	CAPT METH	DATE DAY	DATE MO	LAKE	CACOMMENTS CD
									19	89		
D	331	RB	324			5	SC	CR	13	8	WILLI1	EMBAYMENT NABESCHE
D	118	RB	353	425	14	5	SC	CR	8	7	WILLI1	LAKE SHORE SCHOOLER
D	1	RB	348	450	16	5	SC	CR	28	5	WILLI1	EMBAY SCHOOLER
D	230	RB	376	510	16	6	SC	CR	30	7	WILLI1	EMBAYMENT- ADAMS
D	258	RB	377	550		6	SC	CR	2	8	WILLI1	EMBY SCHOOLER/CARBON
D	313	RB	422	765		7	OT	CR	11	8	WILLI1	EMBAYMENT WICKED
D	94	WF	330		16	3	SC	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	90	WF	315		6	3	SC	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	159	WF	301	300		4	SC	CR	16	7	WILLI1	TABLE/CARBON BAYS
D	91	WF	333	320	16	4	SC	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	95	WF	320	320	16	4	SC	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	93	WF	355	385	16	4	SC	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	92	WF	345	390	16	4	SC	CR	25	6	WILLI1	BAYS PNT/SCHLR/NAB
D	289	WF	372	750		5	SC	CR	6	8	WILLI1	EMBAYMENT BERNARD

SP RB=RAINBOW TROUT BT = BULL TROUT KO = KOKANEE
AG = ARCTIC GRAYLING WF = WHITEFISH LING = BURBOT
SEX 99 = IMMATURE SEX INDETERMINATE M=1..10, F = 11..21
1..6, 11..16 DEVELOPING 07-17 GRAVID 08-18 RIPE
09-19 SPENT

RB	FL	STDS	NO
2+	283	13.5	15
3+	322	21	67
4+	339	27.5	29
5+	342	15.5	3
6+	377	.71	2
7+	422		1

BT	F.L.	STDS	NO.
2+			
3+			
4+	303	14	3
5+	325	27	11
6+	369	83	5
7+	393	73	6
8+	497	65	8
9+	519	75	8
10+	624	138	4
11+	636	50	2
12+	777		1